1. A microneedle array device, comprising:
a substrate having a substantially planar surface; and
a plurality of hollow non-silicon microneedles on the planar surface of the substrate, each of the microneedles having a microchannel therethrough that provides communication between at least one input port at a proximal end of each of the microneedles and at least one output port at an opposite distal end that extends beyond an edge of the substrate.

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2. The microneedle array device of claim 1, wherein the microneedles each have a bottom wall, two side walls, and a top wall that define a microchannel.

3. The microneedle array device of claim 1, wherein the bottom wall is formed at least partially on top of the planar surface of the substrate and the side walls and top wall are formed around a removable molding material.

4. The microneedle array device of claim 1, wherein the microneedles comprise a two dimensional array.

5. The microneedle array device of claim 1, wherein the microneedles comprise a three dimensional array.

6. The microneedle array device of claim 5, wherein the three dimensional array comprises a plurality of two dimensional arrays with spacers therebetween.

7. The microneedle array device of claim 6, wherein the three dimensional array is bonded together by a material selected from the group consisting of molding materials, polymeric adhesives, and combinations thereof.

8. The microneedle array device of claim 1, wherein the microneedles are aligned substantially parallel to each other on the substrate.

9. The microneedle array device of claim 1, wherein the distal end of each microneedle extends beyond the edge of the substrate a distance from about 10 μm to about 100 mm.

10. The microneedle array device of claim 1, wherein the microchannel in each of the microneedles has a cross-sectional area in the range from about 25 μm^2 to about 5000 μm^2.

11. The microneedle array device of claim 1, wherein the length of each microneedle is from about 0.05 μm to about 5 mm, and the width of each microneedle is from about 0.05 μm to about 1 mm.

12. The microneedle array device of claim 1, wherein the center-to-center spacing between individual microneedles is from about 50 μm to about 200 μm.

13. The microneedle array device of claim 1, wherein the substrate comprises a material selected from the group consisting of glass, semiconductor materials, metals, ceramics, plastics, and composites or combinations thereof.

14. The microneedle array device of claim 1, wherein the microneedles are composed of a material selected from the group consisting of metals, plastics, ceramics, glass, carbon black, and composites or combinations thereof.

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15. The microneedle array device of claim 1, wherein the microneedles are composed of a metal material selected from the group consisting of nickel, copper, gold, palladium, titanium, chromium, and alloys or combinations thereof.

16. The microneedle array device of claim 1, wherein the microneedles can withstand flow rates of up to about 1.5 cc/sec.

17. The microneedle array device of claim 1, further comprising a coupling channel member that provides fluid communication between the microneedles.

18. The microneedle array device of claim 17, wherein the coupling channel member is composed of the same material as the microneedles.

19. The microneedle array device of claim 1, further comprising a pair of structural support members that mechanically interconnect the microneedles and that precisely control penetration depth of the microneedles.

20. The microneedle array device of claim 1, wherein the microneedles have a plurality of input ports.

21. The microneedle array device of claim 1, wherein the microneedles have a plurality of output ports.

22. A microneedle array device, comprising:

a plurality of hollow non-silicon microneedles having a microchannel therethrough that provides communication between at least one input port at a proximal end of each of the microneedles and at least one output port at an opposite distal end; and

at least one structural support member that interconnects the microneedles.

23. The microneedle array device of claim 22, wherein the microneedles each have a bottom wall, two side walls, and a top wall that define a microchannel.

24. The microneedle array device of claim 22, wherein the microneedles comprise a two dimensional array.

25. The microneedle array device of claim 22, wherein the microneedles comprise a three dimensional array.

26. The microneedle array device of claim 22, wherein the microneedles are composed of a material selected from the group consisting of metals, plastics, ceramics, glass, carbon black, and composites or combinations thereof.

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27. The microneedle array device of claim 22, wherein the microneedles are composed of a metal material selected from the group consisting of nickel, copper, gold, palladium, titanium, chromium, and alloys or combinations thereof.

28. The microneedle array device of claim 22, further comprising a coupling channel member that provides fluid communication between the microneedles.

29. The microneedle array device of claim 22, wherein the microneedles are mechanically interconnected by a plurality of structural support members.

30. The microneedle array device of claim 29, wherein the structural support members precisely control penetration depth of the microneedles.

31. The microneedle array device of claim 22, wherein the microneedles have a plurality of input ports.

32. The microneedle array device of claim 22, wherein the microneedles have a plurality of output ports.

33. A microneedle device, comprising:

a substrate having a substantially planar surface; and

a hollow non-silicon microneedle on the planar surface of the substrate, the microneedle having at least one microchannel therethrough that provides communication between at least one input port at a proximal end of the microneedle and at least one output port at an opposite distal end that extends beyond an edge of the substrate.

34. The microneedle device of claim 33, wherein the distal end of the microneedle extends beyond the edge of the substrate a distance from about 10 μm to about 100 mm.

35. The microneedle device of claim 33, wherein the microchannel in the microneedle has a cross-sectional area in the range from about 25 μm^2 to about 5000 μm^2.

36. The microneedle device of claim 33, wherein the substrate comprises a material selected from the group consisting of glass, semiconductor materials, metals, ceramics, plastics, and composites or combinations thereof.

37. The microneedle device of claim 33, wherein the microneedle is composed of a metal material selected from the group consisting of nickel, copper, gold, palladium, titanium, chromium, and alloys or combinations thereof.

38. The microneedle device of claim 33, wherein the proximal end has a plurality of input ports.

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39. The microneedle device of claim 33, wherein the distal end has a plurality of output ports.

40. The microneedle device of claim 33, further comprising a plurality of microchannels therethrough.

41. The microneedle device of claim 33, further comprising a structural support to control penetration depth.

42. The microneedle device of claim 41, wherein the structural support is adapted to mechanically fix the microneedle device to a surface that is penetrated by the microneedle.

43. A microneedle device, comprising:

a hollow elongated shaft composed of a non-silicon material, the shaft defining at least one microchannel therethrough and having a proximal end and a distal end;

at least one input port at the proximal end of the shaft and at least one output port at the distal end, the microchannel providing communication between the at least one input port and the at least one output port.

44. The microneedle device of claim 43, wherein the microchannel has a cross-sectional area in the range from about 25 μm^2 to about 5000 μm^2.

45. The microneedle device of claim 43, wherein the elongated shaft is composed of a metal material selected from the group consisting of nickel, copper, gold, palladium, titanium, chromium, and alloys or combinations thereof.

46. The microneedle device of claim 43, wherein the proximal end has a plurality of input ports.

47. The microneedle device of claim 43, wherein the distal end has a plurality of output ports.

48. The microneedle device of claim 43, further comprising a plurality of microchannels therethrough.

49. The microneedle device of claim 43, further comprising a structural support to control penetration depth.

50. The microneedle device of claim 49, wherein the structural support is adapted to mechanically fix the microneedle device to a surface that is penetrated by the elongated shaft.

51. A method of fabricating a microneedle, comprising the steps of:

providing a substrate with a substantially planar surface;

depositing a metal material on the planar surface to form one or more bottom walls for one or more microneedles;

coating a top surface of the one or more bottom walls with a photoresist layer to a height corresponding to a selected inner height of a microchannel for the one or more microneedles;

depositing a metal material to form side walls and a top wall upon the one or more bottom walls and around the photoresist layer; and

removing the photoresist layer from the microchannel of the one or more microneedles.

52. The method of claim 51, wherein the metal material is deposited by an electroplating process.

53. The method of claim 51, wherein the metal material is selected from the group consisting of palladium, titanium, chromium, nickel, gold, copper, and alloys thereof.

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